**Use of Fruit Wastes in Nutritional Enrichment Use of Fruit Wastes in Nutritional Enrichment**

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**ARTICLE HISTORY**

**Received**

15 August 2022

**Accepted**

18 October 2022

**KEY WORDS**

Apple,

citrus,

pomegranate,

fruit wastes,

nutritional enrichment

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| **ABSTRACT**  Fruits, which are widely consumed around the world due to their nutritive properties and being able to be processed and consumed in different ways, also generate high levels of waste during processing. The increase in fruit waste, which was produced approximately 26 million tons in Turkey and 1.3 billion tons in the world in 2012, causes an increasing damage on the ecosystem. These wastes are mostly used as animal feed and fertilizer. Since the wastes of fruits, for which a high level of fuel and water are used in their production, contain many bioactive components, the use of these wastes in nutrient enrichment instead of animal feed seems to be a suitable method for evaluating fruit wastes. Today, multi-dimensional research on the evaluation of various bioactive components that these wastes contain and have many positive effects on health are increasing, and the studies show promising results. Studies show that fruit waste can be used for various purposes such as bulking agent, edible film, nutrient enrichment, and shelf-life enhancer. In this review article, it is aimed to compile current studies in which wastes of some fruits are added to foods for various purposes. Üretiminde yüksek düzeyde yakıt ve su harcanan meyvelerin atıkları birçok biyoaktif bileşeni barındırdığından bu atıkların hayvan yemi yerine besin zenginleştirmede kullanılması meyve atıklarını değerlendirmede uygun bir yöntem olarak görünmektedir. uygun bir yöntem olarak görünmektedir. |

**Introduction**

Piterresi et al. posted in 2012 the characterization and manufacturing of electrospun fibers of the proposed --poly(N-2-hydroxyethyl)-DL-aspartame-graft-polylactic acid (PHEA-g-PLA) copolymer for the cap potential to close by the release of ibuprofen. Before the electrospinning technique, a physically certain medicated solution with PHEA-g-PLA and/or a chemically certain medicated solution with PHEA-g-PLA was modified into organized. The synthesis of PHEA-g-PLA copolymer become done with the usage of an answer of 1. eighty g of PHEA in 36 ml of anhydrous DMSO and 1.7 ml of DEA as a catalyst. The reaction becomes mounted below the Argon fuel line for twenty-4 hours at 40 0C.PHEA-gPLA-IBU medicated copolymer answer; 117,15 mg of IBU become dissolved in 1. five ml of anhydrous DMC and saved for a half-hour at -14 0C withinside the presence of 7 mg of DMAP and 117,15 mg of DCC. Then, the IBU solution becomes modified and added dropwise to a 500 mg PHEA-g-PLA solution in 4. five ml of DCM. This chemical synthesis reaction took place at -14 0C for 1 hour, and then it become at room temperature for 3 hours. The nanofibers of these samples, on the alternative hand, have been created with the useful resource of electrospinning after obtaining the medicated copolymer solution with the physical combination of five% IBU and PHEA-g-PLA polymer at the most useful ratios in the solvent combination of acetone and N, N-dimethylformamide. Dulbekko phosphate buffer (DBSO) answer become used for launch testing. A piece of decreased nanofiber withinside the buffer answer modified and dissolved, and a sample is modified and become taken at sure time durations. These samples were examined with the useful resource of the UV-vis technique. Images of drug-loaded nanofiber structures were inquisitive about the useful resource of SEM [1].

**Material and Methods**

It is of incredible significance to save blood loss in wounds due to accidents, emergencies, diverse diseases, and surgical interventions and to heal wounds speedy without the threat of infection [1]. Although bleeding might also additionally appear easy in such cases, prevention of blood loss is of essential significance. Also, one of the largest risks for open or closed wounds is infection. Antibiotics have to end up crucial safety in opposition to the threat of infection [1].

In this study, Tetracycline Hydrochloride antibiotic and Collagen anti-bleeding agent became loaded onto the tissue scaffold received with the aid of using blending Polyvinyl alcohol (PVA) and Chitosan. Thus, it's far aimed to achieve a biomaterial that hastens the recovery technique of wounds without the threat of infection. For this, first of all, a tissue scaffold became received from Polyvinyl alcohol (PVA) and Chitosan with the aid of using the electrospinning method. Collagen astringent and Tetracycline Hydrochloride had been delivered to the tissue scaffold on the charges stated withinside the content. Codes had been given to the samples received. SEM pictures of the samples are given in Figure 1(a) above [1].

**Material**

Of the substances for use withinside the research: PVA (polyvinyl alcohol) Acn Chemical Mad.İnş tex. conf. Singing. ve Tic.A.Ş. Chitosan became obtained from Acros Organics. Acetic acid and different chemical compounds have been bought from Sigma Aldrich. Tetracycline hydrochloride and physiological saline have been furnished with the aid of using Mustafa Nevzat İlaç san. A collagen hemostatic agent became received from the Pahacel hemostat. P. aeruginosa and S. aureus microorganisms have been received from the microbiology laboratory of the Faculty of Medicine, Kahramanmaraş Sutcu Imam University. The media used for bacterial cultivation (sheep blood agars) have been received from Salubris A.Ş. In addition, the microbiology laboratory of Kahramanmaras Sutcu Imam University became used for the flame burner, tube spores, and bacterial germ cells used in the course of the research to decide antibacterial properties.

**Methods**

In the study, solutions to chitosan in several bureaucracies were first prepared and drawn via electrospinning, and nanofibers were received from PVA-supported chitosan. After obtaining nanofibers from chitosan, the acetic acid answer became become a prepared option to acquire the samples, and all parameters have been tried to be saved consistently for each sample.

For the education of biomaterials, one-of-a-type solutions had been prepared after which blended. The first solution weighs 10 g. As the solvent for the answer, 2% acetic acid became used. PVA and chitosan have been dissolved in a 2% acetic acid answer in a magnetic stirrer for twenty-4 hours at room temperature. Second, for 2 hours at room temperature, hemostatic collagen matrix and antibiotic tetracycline hydrochloride have been dissolved in saline (with the aid of using weight) in a magnetic stirrer. The solutions were blended. In all prepared solutions for nanofiber spinning, the total percentage of additives (PVA, chitosan, collagen, and tetracycline hydrochloride) withinside the solution is normally 10%. Furthermore, an normal saline answer of 3.5 g became used withinside the education of the second solution, and the number of solids withinside the solution became saved constantly. When making ready the physiological saline answer, the quantity of soluble salt and the NaCl content material of the answer have been taken into account, and 3.5 g of physiological saline answer have become used after a few experiments. Finally, the samples were assigned codes for each prepared solution, which can be listed in Table 1 together with their respective ratios.

**Table 1** Sample codes and rates

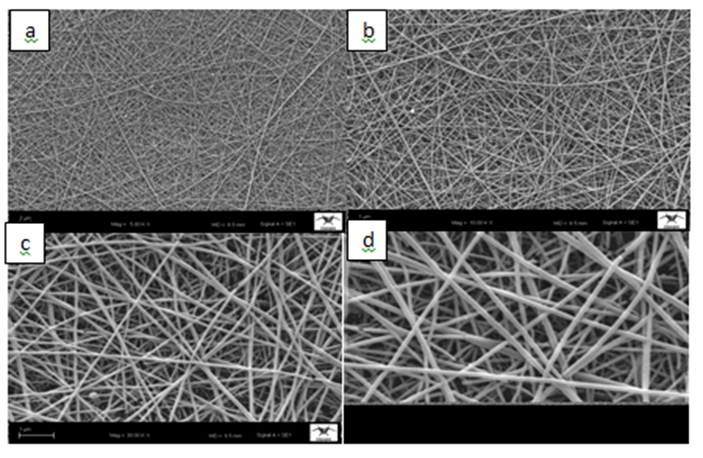
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Biomaterial Code | Additive ratios in biomaterials | | Collagen and Tetracycline Hydrochloride added to Chitosan | |
| PVA (%) | Chitosan + Collagen + Tetracycline Hydrochloride (%) | Collagen (%) | Tetracycline hydrochloride (%) |
| T5 | 60 | 40 | 0 | 0 |
| T10 | 60 | 40 | 10 | 10 |
| T15 | 60 | 40 | 10 | 15 |
| T20 | 60 | 40 | 10 | 20 |
| T25 | 60 | 40 | 10 | 25 |

**Results**

**Scanning electron analysis results**

During the tries to create a splendid nanofiber from chitosan, it turned into observed that the super ground turned acquired with the useful resource of PVA. The PVA-supported chitosan solution became a 2% acetic acid solution. The ground turned first fashioned from the chitosan-PVA answer thru electrospinning, after which the T manipulator code turned into indicated. Then, the 10% hemostatic collagen matrix and T10 sample with 10% tetracycline hydrochloride, T15 sample with 15% tetracycline hydrochloride, T20 sample with 20% tetracycline hydrochloride, T25 sample with 25% tetracycline hydrochloride, and T30 sample with 30% tetracycline hydrochloride have been done inside the prepared PVA-chitosan solution with the useful resource of the electrospinning method. SEMS Photographs had been taken to represent six surfaces, including a manipulator and 5 samples.

EM snapshots were acquired to symbolize the T-coded controlled ground prepared with the useful resource of the use of the electrospinning technique from a PVA-brought chitosan solution in 2% acetic acid (Figure 2). By studying the SEM pictures of the prepared T-coded controlled ground, it changed into decided that the morphological form had come to be easy and uniform, and non-forestall fiber formations have been placed at the ground.



**Fig 2** Sem İmages of T sample at different magnification ratios **a.** 5.00 kx magnification **b.** 10.00 kx Magnification **c.** 30.00 kx Magnification **d.** 50.00kx magnification

Due to the polycationic nature of chitosan, this is due to amine agencies in acidic solutions, it's miles more difficult to accumulate a fiber form with the useful resource of the electrospinning technique. The polycationic person of chitosan excessively will increase the ground tension of the solution and effects withinside the formation of droplets at the collection electrode all through the electrospinning process [15, 17, 18].

**Conclusion and Discussion**

Tissue ground has become to be had thru the use of a mixture of polyvinyl alcohol (PVA) help polymer and Chitosan. Through the electrospinning technique, nanofiber biomaterials were obtained together with Collagen Hemostatic Matrix and Tetracycline hydrochloride antibiotic at precise rates into this biomaterial. To study the form of the obtained biomaterials, SEM analyses were performed and the results were visible. To study the overall performance of the biomaterial in vitro, the colonies common thru culturing microorganisms were counted.

To use the prepared samples as biomaterials, in vitro exams had been performed in the laboratory environment. The effectiveness of the prepared solutions on grammatical excessive pleasant and bad microorganisms changed into an investigation. Due to sowing on sheep blood agar with 0.5 McFarland bacterial solutions prepared with physiological saline, it changed into discovered that it has become effective at particular rates on gram excessive pleasant (S. aureus) and gram bad microorganisms (P. aeruginosa). Biomaterials had been located to be extra effective in competition to gram-excessive pleasant (S. aureus) microorganisms than gram-bad (P. aeruginosa) microorganisms.

**Abbreviations**

var.: Variety/Varyete, subsp.: Subspecies/Alttür, L.: Carl Linnaeus, Pierre Edmond Boissier: Boissier, DC.: de Candolle, M. Bieb.: Friedrich August Marschall von Bieberstein, Schult: Josef August Schultes, Roem.: Max Joseph Roemer, Sint.: Paul Ernst Emil Sintenis, Freyn: Josef Franz Freyn, Dahlst.: Gustav Adolf Hugo Dahlstedt, HARRAN: Harran University Faculty of Arts and Sciences Herbarium/Harran Üniversitesi Fen-Edebiyat Fakültesi Herbaryumu.

**Acknowledgments**

We would like to thank the administrators and teachers of Şanlıurfa Ayşegül Kaman Anatolian High School and the valuable resource people whose information we consulted for making this study easier.

**Funding**

The author did not receive support from any organization for the submitted work.

**Data Availability statement**

The author confirms that the data supporting this study are cited in the article.

**Compliance with ethical standards**

**Conflict of interest / Çıkar çatışması**

The author declare no conflict of interest.

**Ethical standards**

The study is proper with ethical standards.

**Authors’ contributions**

During the study, Mehmet Maruf BALOS conducted field research, Hasan AKAN and Mehmet Maruf BALOS wrote the article.

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